



Oliver Heaviside (1850-1925)

A PORTION of Oliver Heaviside's personal library is now on exhibition in the M. I. T. Library, with a number of autograph letters and other memorabilia. These were gathered together by the late Dr. B. A. Behrend, who was for many years one of Heaviside's warmest friends and supporters in this country. The exhibit constitutes the first and only showing in America of this material, which will shortly be sent over to England to be united with similar Heavisidiana in the library of the Institution of Electrical Engineers.

Although recognized at the time of his death in 1925 as "un des plus grands savants," ranking with "the greatest philosophers, Archimedes, Newton, Kelvin, and Faraday," and acclaimed by Sir Oliver Lodge as "a mathematical genius of exceptional ability," Heaviside lived the greater part of his life in poverty and obscurity. His three volumes of *Electro-magnetic Theory*, coöordinating the earlier *Electrical Papers* separately published, are now consulted by all serious students of mathematics, physics, and electrical engineering. Through the "Heaviside-Kennelly layer" and "Heaviside's operators" his name has come to be linked with present-day investigations to which he made valuable contributions forty years ago. "From the practical point of view," however, states Alexander Russell, "Heaviside's most important work was laying the foundation of the modern theory of telephonic transmission; a theory which has proved a veritable gold mine for the practical telephonist."

In these intimate letters to Dr. Behrend, as well as in the annotations abounding in the pages of his books, we get a glimpse of the personality and temperament of this retiring genius which adds great interest to his published writings. Refusing as he did to take part in the public discussions of his day, he seems to have enjoyed a solitary debate with the scientific writers whose works he read, scattering notes, markings, and

# Oliver Heaviside

*As Seen in His Books and Letters*

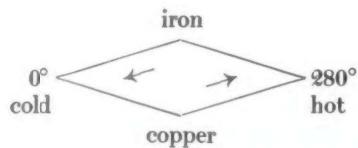
BY KATHARINE MAYNARD

mathematical computations through to the very end-papers of these volumes from his personal library.

How often are his authors "vague," "wrong decidedly," "bad and wrong," "very irregular," "wrong, wrong," "monstrous." He finds a certain method "very clumsy"; questions "Why" and "Why not?" frequently; and asserts bluntly here and there: "Won't do"; "Don't need so many apologies"; "Don't like this demonstration — See my note for a simpler one"; "This way is academical humbug"; "Rot, rot"; "Nonsense!"

The exactness and precision of Heaviside's own methods are reflected in numerous comments. Thus, after a statement of the analysis of sulphate of copper he takes pains to total the percentages, adding 100 in pencil. Opposite a footnote in Perry's *Applied Mechanics* explaining that a bicycle "geared to 53 inches goes at 10 miles per hour when the pedals make one turn per second," we find the correction: "Should be 56 very closely." Again, when his friend Perry gives a "Mnemonic" for a certain equation, Heaviside's directness advises: "Call it Law or Rule."

In an early work on telegraphy where a footnote on the voltameter reads: "It is necessary to use platinum, as the oxygen combines with all oxidable metals," this self-taught purist expostulates: "that is to say, the oxygen combines with all metals which combine with oxygen!" He would even amend Lord Kelvin's discussion of thermoelectricity, exclaiming: "This terminology I find provoking in the extreme. Difficult to make head or tail of it. Put it this way, and I can understand it." This is followed by his own explanation with a diagram of the thermocouple familiar to every student:



Another chapter of the *Mathematical and Physical Papers*, that on the "Restoration of Mechanical Energy from an Unequally Heated Space," finds Heaviside equally critical. He verifies, or improves upon, the computations here given with an eloquent "Oh! Thomson!" in the margin, and pronounces at the close this considered verdict:

"I am bound to say that the above paper is not worthy of Thomson's genius. Such extraordinary blindness. No doubt caused by his sticking to  $\mu$  instead of adopting absolute temperature referred to dilatation of a perfect gas . . ."

Living as a recluse from the age of twenty-four, Heaviside nevertheless enjoyed communion with a selected circle of warm friends (*Continued on page 234*)

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through a voluminous correspondence. Dr. Behrend was one of these friends, and it was through his influence that Heaviside was prevailed upon to accept honorary membership in the American Institute of Electrical Engineers in 1918. From one of the letters exhibited we learn that the first proposal of the honor met with this characteristic rebuff:

I think honors have been very much overdone; the more honors, the less value. It is depreciating the currency, and I hope the U. S. A. will not be led to imitating Britain in this respect. As regards scientific honors, I think that if a scientific man has received one or two good honors to "recognize" him, nothing useful is gained by their multiplication, and the effect may even be the other way. And yet it is very unpleasant to refuse them.

It makes me wish I had stopped at the tail F.R.S., with perhaps a good Honorary Ph.D. to balance the tail, by giving one the title of Doctor. For there are doctors in nearly every street (or there would be but for the war, which has improved the public health and lowered the death rate), and so people do attach some sort of consequence to the title, whilst F.R.S. means nothing at all, being less than F.R.H.S., to which our respected gardening townsman belongs by paying a guinea. Of late years there has been a perfect flood of new honors, and even the women have caught the plague . . .

If I were offered a Dukedom I might take it, having already an estate properly mortgaged up to its full capacity; and I should think I was doing the tribe of Dukes an honor by joining it; besides that, in private, I should derive great amusement from the transaction, and eat my rations with more zest.

Dr. Behrend persevering, however, there was a graceful capitulation, and in the end Heaviside declares:

I do not change my opinions about the multiplication of "honors" in the least. But you are evidently so sincere and well wishing yourself in the matter that I am obliged to withdraw all objection and do myself the honor of accepting your proposition, and of those who may think with you . . .

Your letter is my justification.

With real feeling he rejects the suggestion that he had been forgotten, averring with warmth,

Hardly that. I have had some of the best friends a man could have, — Fitzgerald, Rayleigh, Kelvin, Hertz, and others. The first named was a noble soul indeed.

The honorary degree from Göttingen, awarded in 1905 "under the auspices and by the authority of the most puissant and august prince and lord Wilhelm II," had long since provided the desired "balance" to the Royal Society's fellowship which Heaviside mentions as the *tail* of his honors. But it was ever his way to scoff at ceremoniousness, and he one day enclosed the documentary evidence of this degree in an envelope addressed to Dr. Behrend with the superscription:

"If undelivered, please return to  
Kaiser Bill, care of Dr. Heaviside  
Duke of Homefield  
Torquay, England."

It may well be believed, however, that this continental recognition of his attainments brought with it no small satisfaction. The felicitous phrasing, translated from the Latin reads:

That Eminent Man

OLIVER HEAVISIDE

An Englishman by Nation, Dwelling at Newton Abbot  
Learned in the Artifices of Analysis  
Investigator of the Corpuscles which are Wont to be Called  
Electrons  
Perservering, Fertile, Happy though Given to a Solitary Life  
Nevertheless among the Propagators of the Maxwellian  
Science Easily the First.

"Kaiser Bill" became later a favorite by-word with him, and one of his war-time letters closes with the sardonic statement:

"For information of Censor. Kaiser Bill is one of the best friends we have ever had, because he is waking us up."

In a similar way would he seek to personify his grievances and discomforts. Thus he "was poisoned by some of [Woodrow] Wilson's Chicago bacon," and complains, "Owing to Wilson's coming into the War so late, things have been very bad here both as regards food and fuel."

It is well known that Heaviside enjoyed the coining of new words to express his concepts with complete satisfaction. He seems to have played with the idea of associating his name with the loading of lines by a new term for this application of his great invention, remarking: "You do not take notice of my *Heavify*, *Heavification* idea — perhaps you thought it only a joke." This alludes to a previous letter to Dr. Behrend in which he proposed semi-seriously:

Nomenclature. A committee might settle that. Heavy and loading are closely connected. It was preordained. Like my experiments with knotted clothes lines and other things, shot, stones, and so on, done in the back yard at the age of 12 to 13. They sank in, tho' I had no notion of any application then. The *side* should be omitted. I never suffered much from it; they said it was swelled head. *Heavify* and *Heavification* seem to me the best.

In a post-script to this same letter the following incident is reported with evident relish:

A friend of mine now working at the Aircraft Factory at Farnboro told me a funny story about his visit to the U. S. some years ago. He had mentioned me, and received this startling information: "Heaviside? Is he still living? I thought he was one of the classics!" Now that is real fame, isn't it? And I may live 20 years more if I can keep out the rheumatism and damp cold which is the plague of England, and have the pleasure of hearing such remarks again . . . So you see there are compensations. I dare say I am better known as a classic in the U. S. than in Britain.

In an institution where Heaviside is well recognized as "one of the classics" in electrical engineering, it is particularly appropriate to bring his work to the attention of present-day students through this library exhibit. It is likewise a privilege to see a great scientist thus revealing himself frankly — and how entertainingly! — in a friendship that does equal honor to the writer and the recipient of these interesting letters.